

WHAT IS CLAIMED IS:

1. A method for detecting microorganism DNA comprising:
 - (a) hybridizing the microorganism cDNA with microorganism-specific probes in hybridization tube wherein the probe linked to magnetic bead;
 - 5 (b) transferring hybridization tubes to magnetic wells for washing;
 - (c) adding blocking solution into the tubes;
 - (d) adding avidin enzyme complex or streptavidin enzyme complex into the tubes
 - (e) performing washing reaction to remove interfering material by the aid
 - 10 of magnetic field;
 - (f) suspending magnetic beads; and
 - (g) detecting the luminescent or color change after adding substrate of enzyme.
2. The method of Claim 1, wherein the microorganism is *Mycobacterium*
- 15 *tuberculosis*.]
3. The method of Claim 1, wherein the microorganism cDNA are obtained from the PCR amplification mediated by bioactive primers.
4. The method of Claim 1, wherein the streptavidin enzyme complex in the step (d) is streptavidin horseradish peroxidase (SA-HRP).
- 20 5. The method of Claim 1, wherein the step (f) suspending magnetic beads is performed by vortexing the tube.
6. The method of Claim 1, wherein the detection of the step (g) is performed by luminometer or spectrophotometer.
7. The method of Claim 1, wherein the steps (a)-(g) are performed in the same
- 25 tube.
8. An apparatus for performing the dissociation of nucleic acid double strands,

hybridization, washing, the separation of magnetic beads and thermal control in the same apparatus, comprising:

- (a) the means for fitting reaction containers;
- (b) the means for controlling the temperature of the containers; and
- 5 (c) the means for controlling the magnetic force of the containers,

wherein the means for controlling the temperature of the containers are connected to the means for fitting reaction containers, and the means for controlling the magnetic force of the containers are connected to the means for fitting reaction containers.

- 10 9. The apparatus of Claim 8, wherein the means for controlling the temperature of the containers to heat the containers to perform the dissociation of nucleic acid double strands according to temperature change.

10. The apparatus of Claim 8, wherein the means for controlling the magnetic force of the containers to perform the magnetic change of magnetic bead to
15 facilitate hybridization, washing and the separation of magnetic beads in the containers.

11. A diagnostic kit for detecting microorganism cDNA comprising:

- (a) a probe linked to magnetic bead;
- (b) bioactive primers;
- 20 (c) avidin enzyme complex or streptavidin enzyme complex; and
- (d) nzyme substrate.

12. The kit of Claim 11, wherein the bioactive primers are made by reacting DNA labeling reagent with the primers.

13. The kit of Claim 12, wherein the DNA labeling reagent is the compound
25 having the formula:



wherein Fu represents a furocoumarin derivative selected from the group

consisting of angelicin derivatives and psoralen derivatives;

wherein BE represents none or a binding enhancer selected from the group consisting of C4-12 alkyl, alkyenyl, polyalkylamine and polyethylene glycol; and Wherein D represents a detectable group selected from the group consisting of: biotin, fluorescence, acridinium ester and acridinium-9-carboxamide.

14. The kit of Claim 12, wherein the DNA labeling reagent is 9-(4"-(Aminomethyl)-4', 5"-Dimethyl-angelicin) acridinium carboxamide.

15. An assay system for detecting microorganisms, the system comprising:

(i) diagnostic kit for detecting microorganism cDNA comprising:

- (a) a probe linked to magnetic bead;
- (b) bioactive primers;
- (c) avidin enzyme complex or streptavidin enzyme complex; and
- (d) enzyme substrate

(ii) an apparatus for performing the dissociation of nucleic acid double strands, hybridization, washing, the separation of magnetic beads and thermal control in the same apparatus, comprising:

- (a) the means for fitting reaction containers;
- (b) the means for controlling the temperature of the containers; and
- (c) the means for controlling the magnetic force of the containers,

wherein the means for controlling the temperature of the containers are connected to the means for fitting reaction containers, and the means for controlling the magnetic force of the containers are connected to the means for fitting reaction containers;

(iii) a magnetic rack to bind the magnetic bead on the wall of the

containers; and

(iv) a detector.

16. The assay system of Claim 15, wherein the bioactive primers are made by reacting DNA labeling reagent with the primers;

17. The assay system of Claim 15, wherein the streptavidin enzyme complex in

the kit is streptavidin horseradish peroxidase (SA-HRP).

18. The assay system of Claim 15, which can differentiate *M. tuberculosis* from *M. marinum*, *M. avium* and *M. intracellulare* 19. The assay system of Claim 15, wherein the detector is luminometer or spectrophotometer.

- 5 19
20. The assay system of Claim 15 The kit of Claim 15, wherein the DNA labeling reagent in the kit is 9-(4''-(Aminomethyl)-4', 5''-Dimethyl-angelicin) acridinium carboxamide.

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